

ST120

PN133T Main Board

USER'S MANUAL

Version 1.1

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Introduction

Product Description

ST120 is a high-performance flexible Main board based on the VIA ProSavage TwisterT (PN133T) chipset. The chipset is based on an innovative and scaleable architecture with proven reliability. It is a two-chip set consisting of the VT8606 North Bridge Controller and VT82C686B South Bridge Controller.

ST120 supports the VIA C3 processors that features Native x86 execution, Integrated full-speed 192KB L1/L2 cache, 100/133MHz Front Side Bus, Advanced multimedia instruction set, and MMX™ & 3DNow!™

The VT8606 integrated graphics accelerator supports 8/16/32MB frame buffer using the system memory, integrated 2-channel 110MHz LVDS interface. One Ethernet can be supported by the Realtek 8139C single chip Ethernet controller. Additional key features include support for two USB ports, AC-97 link for audio, hardware monitoring, and power management.

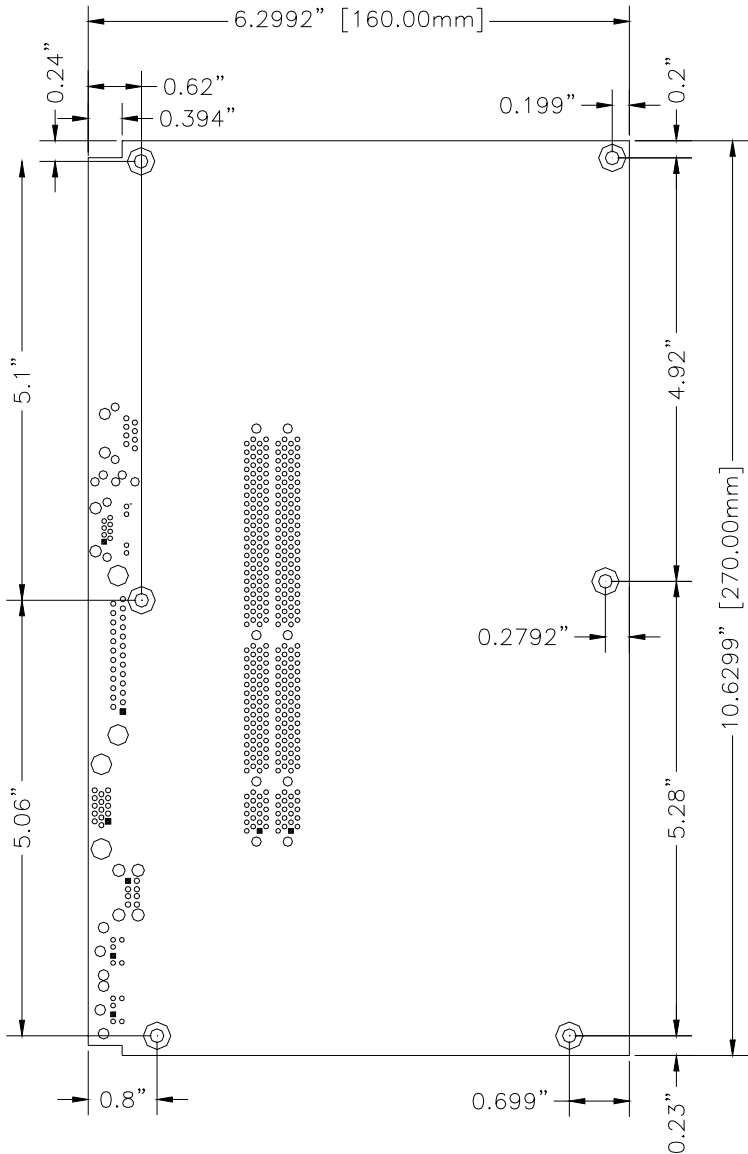
System memory is provided by two 168-pin DIMM socket that accommodates SDRAM with a maximum capacity of 1GB. The Award BIOS facilitates easy system configuration and peripheral setup.

Other advanced features include four serial ports, one optional Cardbus slot (one channel), LAN, USB interface and Compact Flash socket for type 1 CF memory cards.

Specifications

Product Name	ST120
CPU Type	VIA C3 800/1000 MHz Processor
CPU Voltage	1.1V~1.8+5V
CPU FSB	133MHz
Chipset	VIA ProSavage TwisterT (PN133T) + VT82C686A/B North Bridge:VT8606 552 PIN PBGA South Bridge:VT82C686A/B 352 PIN BGA
BIOS	Award BIOS Support ACPI Function
Cache	128K Level/64K Level2 (CPU integrated)
UART/16550A (4 Port)	COM1/2/3/4:RS232 w/16 Byte FIFO COM1: RJ-45 JACK, COM2/3/4: Pin Header
On Board VGA	VT8606 with Integrated Savage4 AGP4x Graphic 8/16/32 MB frame buffer using system memory Integrated 2-channel 110MHZ LVDS interface
LCD interface	Support 36 Bit TTL LCD Interface and 2 channel LVDS
LAN *1	Realtek 8139C Single Chip Ethernet Controller 10/100 BaseT support
Sound	VT82C686A/B Built-in Sound controller + AC97 Codec Realtek ALC101 (Line-out,CD-in.) +Amplify NJM2073
Memory type	2x 168-Pin DIMM 3.3V Max.1GB Support PC100/PC133 DIMM Module
SUPER I/O	VIA VT82C686A/B: Parallel x1, Serial*2, FDC 2.88MB (3 Mode support), Hardware monitor (3 thermal inputs, 4 voltage monitor inputs, VID0-4, 2 fan input) Optional ITE IT8874F: Serial x2 Winbond 83877: Serial x2
RTC/CMOS	VT82C686A/B Built-in
Battery	Lithium Battery
Keyboard Controller	VT82C686A/B
EPP/ECP	Yes
Local bus IDE	VT82C686A/B built-in, IDE1, 2 (Ultra DMA 33)
USB	2 ports, transfer rate up to 12Mb/s, JACK
CompactFlash Socket	Support CompactFlash TYPE I
CardBus	Optional Ti1410 PCI Single Chip Card-bus Controller Support one slot (one channel)
Board Size	160mm x 270mm

Board Dimensions



Installations

This section provides information on how to use the jumpers and connectors on the ST120 in order to set up a workable system. The topics covered are:

Installing the Memory (DIMM)	5
Setting the Jumpers	6
Connectors on ST120	11

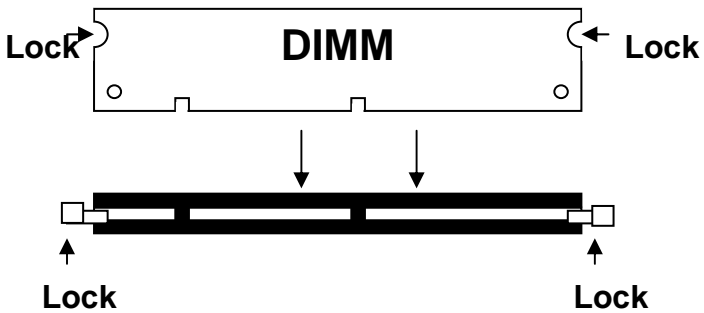
Installing the Memory (DIMM)

The ST120 board supports two 168-pin DIMM socket for a maximum total memory of 1GB in SDRAM type. The memory module capacities supported are 64MB, 128MB, 256MB, and 512MB.

Installing and Removing DIMMs

To install the DIMM, locate the memory slot on the board and perform the following steps:

1. Hold the DIMM so that the two keys of the DIMM align with those on the memory slot.
2. Gently push the DIMM in an upright position until the clips of the slot close to hold the DIMM in place when the DIMM touches the bottom of the slot.
3. To remove the DIMM, press the clips with both hands.



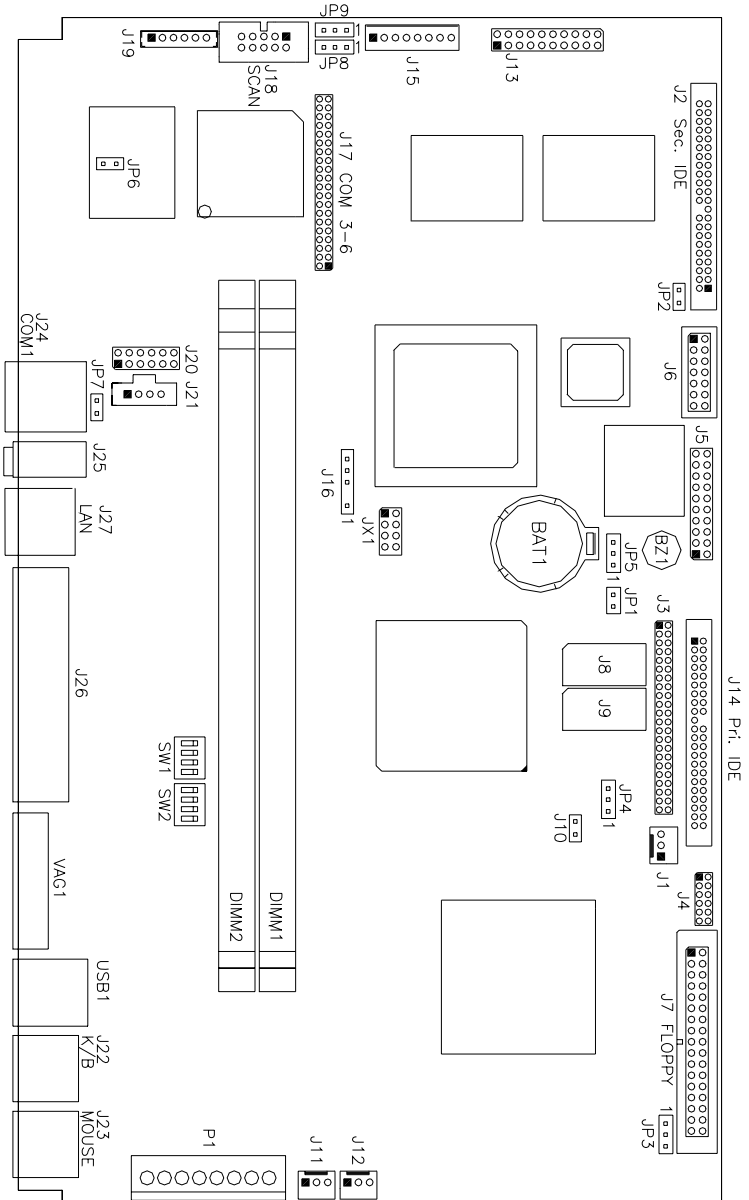
Top View of DIMM Socket

Setting the Jumpers



Jumpers are used on ST120 to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on ST120 and their respective functions.

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

Jumper Locations on ST120





JP1: AT/ATX Power Selection

JP1	Setting	AT / ATX Power
	Short/Closed	Select ATX Power
	Open	Select AT Power



JP2: CF Card Master / Slave Selection

JP2	Setting	Master / Slave
	Short/Closed	Master
	Open	Slave



JP3: FDD Pin 1/3/5 Power Selection

JP3	Setting	Voltage
	Pin 1-2 Short/Closed	+5V
	Pin 2-3 Short/Closed	GND (Default)

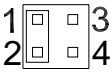
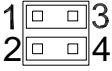
JP4: LCD Power Selection

JP4	Setting	Function
	Pin 1-2 Short/Closed	3.3V (Default)
	Pin 2-3 Short/Closed	+5V

JP5: Clear CMOS Content



JP5	Setting	Function
	Pin 1-2 Short/Closed	Normal Operation
	Pin 2-3 Short/Closed	Clear CMOS Content

JP7: VFD's DSR / CTS Selection



JP7	Setting	Function
	Pin 1-2 Short/Closed	No VFD
	Pin 1-3, 2-4 Short/Closed	VFD Enable

JP8: COM5/COM6 Enable/Disable



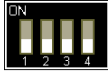
Use this jumper to enable or disable the COM5/COM6 serial ports.

JP8	Setting	Function
	Pin 1-2 Short/Closed	Enable
	Pin 2-3 Short/Closed	Disable

JP9: PCMCIA Slot Enable/Disable

JP9	Setting	Function
	Pin 1-2 Short/Closed	Enable
	Pin 2-3 Short/Closed	Disable

SW2: CPU Bus Speed Selector

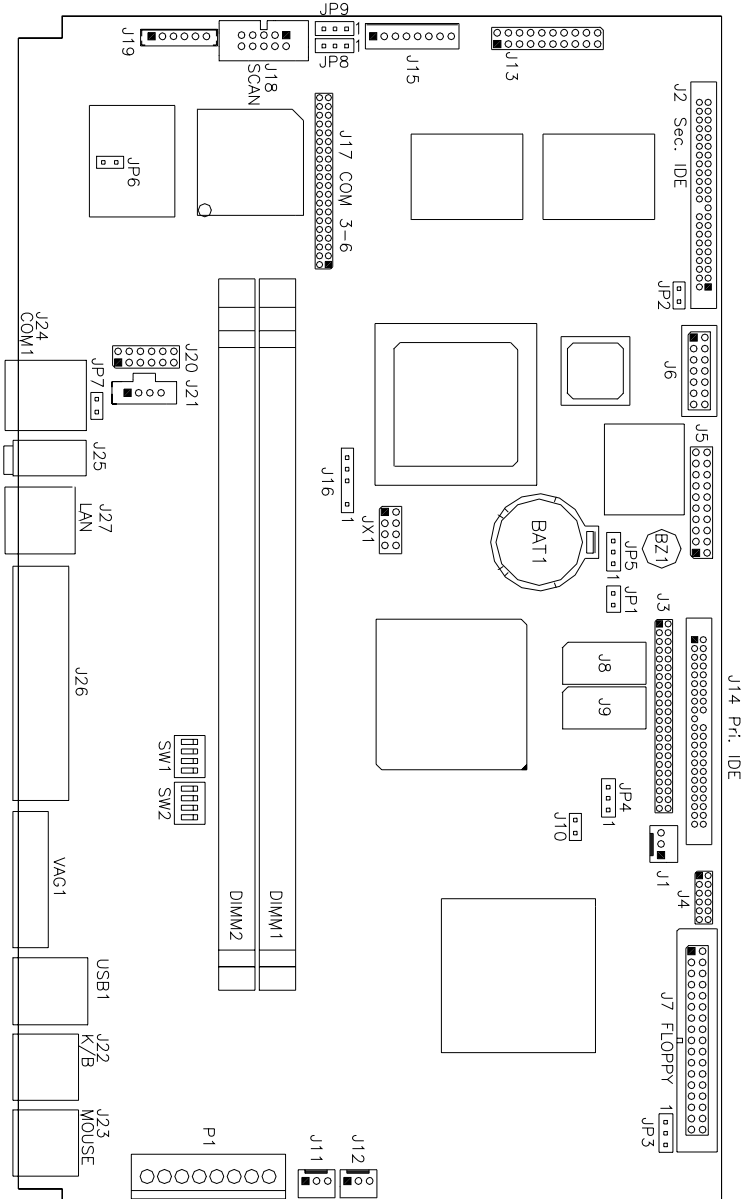
Bus Speed	SW2	Switch Setting
66MHz		off off on on
100MHz		off off off on
133MHz		off off off off

Connectors on ST120

The connectors on ST120 allows you to connect external devices such as keyboard, floppy disk drives, hard disk drives, printers, etc. The following table lists the connectors on ST120 and their respective functions.

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Connector Locations on ST120



Connectors on ST120

P1: Power Connector



Signal Name	Pin #	Pin #	Signal Name
+5V	1	5	GND
+5V	2	6	+12V
GND	3	7	+5VSB
GND	4	8	PS_ON

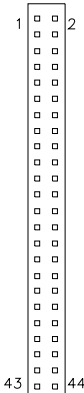
CN1: CompactFlash Socket

J1: LCD Inverter Connector



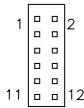
Pin #	Signal Name
1	ENVEE
2	GND
3	+12V

J3: LCD TTL Output Connector (22x2 pin)



Signal Name	Pin #	Pin #	Signal Name
+12V	1	2	+12V
GND	3	4	GND
+5V/3.3V	5	6	+5V/3.3V
ENAVEE	7	8	GND
P0	9	10	P1
P2	11	12	P3
P4	13	14	P5
P6	15	16	P7
P8	17	18	P9
P10	19	20	P11
P12	21	22	P13
P14	23	24	P15
P16	25	26	P17
P18	27	28	P19
P20	29	30	P21
P22	31	32	P23
GND	33	34	GND
SHFCLK	35	36	FLM
MDE	37	38	LP
GND	39	40	ENABKL
GND	41	42	NC
DNAVDD	43	44	+5V/3.3V

J4: LCD TTL Output Connector (6x2 pin)



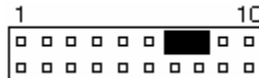
Signal Name	Pin #	Pin #	Signal Name
P24	1	2	P25
P26	3	4	P27
P28	5	6	P29
P30	7	8	P31
P32	9	10	P33
P34	11	12	P35

J5: System Function Connector

The System Function Connector provides interfaces for light indicators of system activities (HDD/Power) and computer status switches.

ATX Power ON Switch: Pins 7 and 8

This 2-pin connector connects to the power switch. When pressed, the power switch will force the system to power on. When pressed again, it will force the system to power off.



Power LED: Pins 4/5/6

The power LED indicates the status of the main power switch.

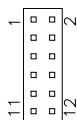


Pin #	Signal Name
4	+5VSB
5	GND
6	+5V

Hard Disk Drive LED Connector: Pins 9 and 10

This connector connects to the hard drive activity LED on control panel. This LED will flash when the HDD is being accessed.

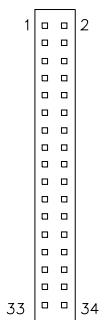


J6: Touch Screen Connector

Signal Name	Pin #	Pin #	Signal Name
DCD2	1	2	DSR2
RXD2	3	4	RTS2
TXD2	5	6	CTS2
DTR2	7	8	+5V
GND	9	10	NC
GND	11	12	GND
NC	13	14	NC

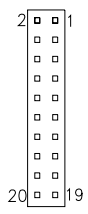
J7: Floppy Drive Connector

J7 is a 34-pin header and will support up to 2.88MB floppy drives.



Signal Name	Pin #	Pin #	Signal Name
+5V/GND	1	2	RM/LC
+5V/GND	3	4	NC
+5V/GND	5	6	NC
GND	7	8	Index
GND	9	10	Motor enable 0
GND	11	12	Drive select 1
GND	13	14	Drive select 0
GND	15	16	Motor enable 1
GND	17	18	Direction
GND	19	20	Step
GND	21	22	Write data
GND	23	24	Write gate
GND	25	26	Track 00
GND	27	28	Write protect
GND	29	30	Read data
GND	31	32	Side 1 select
GND	33	34	Diskette change

J9, J8: 1st and 2nd Channel LVDS Connector (DF13-20)

	Signal Name	Pin #	Pin #	Signal Name
	TX0-	2	1	TX0+
	GND	4	3	GND
	TX1-	6	5	TX1+
	+5V/3.3V	8	7	GND
	TX3-	10	9	TX3+
	TX2-	12	11	TX2+
	GND	14	13	GND
	TXC-	16	15	TXC+
	+5V/3.3V	18	17	ENABKL
	+12V	20	19	+12V

J11: System Fan Power Connector

J11 is a 3-pin header for the system fan. The fan must be a 12V fan.



Pin #	Signal Name
1	GND
2	+12V
3	Rotation detection

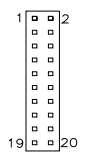
J12: CPU Fan Power Connector

J12 is a 3-pin header for the CPU fan power.



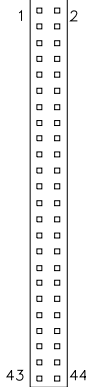
Pin #	Signal Name
1	GND
2	+12V
3	Rotation detection

J13: Con IR Connector

	Signal Name	Pin #	Pin #	Signal Name
	+5VSB	1	2	+5VSB
	NC	3	4	KB_CLK1
	NC	5	6	NC
	NC	7	8	KB_DATA1
	GND	9	10	GND
	GND	11	12	GND
	MSDAT-	13	14	MSDAT#
	NC	15	16	NC
	MSCLK-	17	18	MSCLK#
	NC	19	20	NC

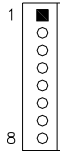
*Default
13-14
17-18
Short

J14, J2: Primary and Secondary IDE Connector



Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	GND
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
GND	19	20	Protect pin
DRQ0	21	22	GND
Host IOW	23	24	GND
Host IOR	25	26	GND
IOCHRDY	27	28	Host ALE
DACK0	29	30	GND
IRQ14	31	32	NC
Address 1	33	34	NC
Address 0	35	36	Address 2
Chip select 0	37	38	Chip select 1
Activity	39	40	GND
+5V	41	42	+5V
GND	43	44	NC

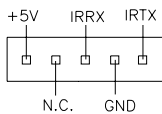
J15: CON 8/F (Card Reader)



*Default
1-2,3-4 Short

Pin	Signal Name
1	KB_CLK2
2	KBCLK#
3	KB_DATA2
4	KBDAT#
5	GND
6	GND
7	+5V
8	+5V

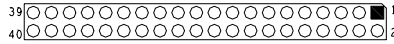
J16: IrDA Connector



Pin #	Signal Name
1	+5V
2	No connect
3	Ir RX
4	GND
5	Ir TX

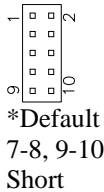
J17: COM3/4/5/6 Serial Ports

J17 is a 40-pin connector for the COM3/4/5/6 serial ports on ST120.



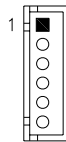
Pin #	Signal Name (RS-232)
1	DCD, Data carrier detect
2	RXD, Receive data
3	TXD, Transmit data
4	DTR, Data terminal ready
5	GND
6	DSR, Data set ready
7	RTS, Request to send
8	CTS, Clear to send
9	RI, Ring indicator
10,20	+12V
30,40	+5V

J18: Scanner Device Connector



Signal Name	Pin #	Pin #	Signal Name
+5V	1	2	GND
RXD1	3	4	TXD1
RTS1	5	6	CTS1
KB_DATA2	7	8	KBDAT-
KB_CLK2	9	10	KBCLK-

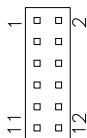
J19: CON 6/F VFD Connector



Pin	Signal Name
1	+12V
2	GND
3	VDSR
4	DSR1
5	TXD1
6	VTXD

J20: Audio Connector

J20, a 12-pin header connector, supports an optional external connector supporting 3 sockets for Line Out, Line In and Mic functions. The following table shows the pin assignments of this connector.



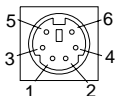
Signal Name	Pin #	Pin #	Signal Name
Line Out R	1	2	Line Out L
GND	3	4	GND
Line In R	5	6	Line In R
GND	7	8	GND
Mic	9	10	BIAS
GND	11	12	NC

J21: CD-in Connector

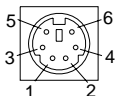
J21 is the 4-pin CD-in connector.



Pin #	Signal Name
1	Right
2	GND
3	GND
4	Left

J22: PS/2 Keyboard Connector

Pin	Signal Name
1	Keyboard data
2	KB_DATA1
3	GND
4	+5V
5	Keyboard clock
6	KB_CLK1

J23: PS/2 Mouse Connector

Pin	Signal Name
1	Mouse data
2	NC
3	GND
4	+5V
5	Mouse clock
6	NC

J24: COM1 Serial Port

The COM1 serial port uses a typical RJ45 connector as its interface connector.

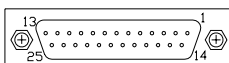
Signal Name	Pin #	Pin #	Signal Name
DCD1	6	1	VDSR
DTR1	7	2	GND
VCTS	8	3	GND
RTS1	9	4	VTXD
RI1	10	5	RXD1

J25: Line Out Connector

The line out connector comes in a phone jack type connector.

J26: Primary Parallel Port Connector

The following table describes the pin-out assignments of this connector.

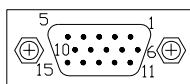


Signal Name	Pin #	Pin #	Signal Name
Line printer strobe	1	14	AutoFeed
PD0, parallel data 0	2	15	Error
PD1, parallel data 1	3	16	Initialize
PD2, parallel data 2	4	17	Select
PD3, parallel data 3	5	18	GND
PD4, parallel data 4	6	19	GND
PD5, parallel data 5	7	20	GND
PD6, parallel data 6	8	21	GND
PD7, parallel data 7	9	22	GND
ACK, acknowledge	10	23	GND
Busy	11	24	GND
Paper empty	12	25	GND
Select	13		

J27: RJ45 Connector for LAN

J28: CardBus Connector

VGA1: VGA CRT Connector

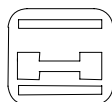


J5

Signal Name	Pin	Pin	Signal Name
Red	1	2	Green
Blue	3	4	NC
GND	5	6	GND
GND	7	8	GND
N.C.	9	10	GND
NC	11	12	NC
HSYNC	13	14	VSYNC
NC	15		

USB1: USB Connector

USB1 consists of a two stacked USB ports. Refer to the section below for the respective pin assignments.



Pin #	Signal Name
1	+5VSB
2	USB-
3	USB+
4	GND

JX1: USB3/4 Connector

JX1 is the onboard USB pin-header that supports an external USB connector with two ports.



Pin #		Signal Name
1	5	+5VSB
2	6	USB-
3	7	USB+
4	8	GND

BIOS Setup

This chapter describes the different settings available in the Award BIOS that comes with the board. The topics covered in this chapter are as follows:

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BIOS Setup	23
Standard CMOS Setup.....	25
Advanced BIOS Features	28
Advanced Chipset Features.....	31
Integrated Peripherals.....	34
Power Management Setup.....	36
PNP/PCI Configurations	39
PC Health Status	40
Frequency/Voltage Control	41
Load Fail-Safe Defaults	42
Load Setup Defaults.....	42
Set Supervisor/User Password	42
Save & Exit Setup	42
Exit Without Saving.....	42

BIOS Introduction

The Award BIOS (Basic Input/Output System) installed in your computer system's ROM supports VIA C3 processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also adds virus and password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

BIOS Setup

The Award BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the Award BIOS is immediately activated. Pressing the key immediately allows you to enter the Setup utility. If you are a little bit late pressing the key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

Press to Enter Setup

In general, you press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help and <Esc> to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Phoenix - AwardBIOS CMOS Setup Utility	
Standard CMOS Features	Frequency/Voltage Control
Advanced BIOS Features	Load Fail-Safe Defaults
Advanced Chipset Features	Load Optimized Defaults
Integrated Peripherals	Set Supervisor Password
Power Management Setup	Set User Password
PnP/PCI Configurations	Save & Exit Setup
PC Health Status	Exit Without Saving
ESC : Quit	↑ ↓ → ← : Select Item
F10 : Save & Exit Setup	
Time, Date, Hard Disk Type...	

The section below the setup items of the Main Menu displays the control keys for this menu. At the bottom of the Main Menu just below the control keys section, there is another section which displays information on the currently highlighted item in the list.

Note: *If the system cannot boot after making and saving system changes with Setup, the Award BIOS supports an override to the CMOS settings that resets your system to its default.*

Warning: *It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both Award and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.*

Standard CMOS Setup

“Standard CMOS Setup” choice allows you to record some basic hardware configurations in your computer system and set the system clock and error handling. If the board is already installed in a working system, you will not need to select this option. You will need to run the Standard CMOS option, however, if you change your system hardware configurations, the onboard battery fails, or the configuration stored in the CMOS memory was lost or damaged.

Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features

Date (mm:dd:yy)	Tue, Mar 26 2000	Item Help
Time (hh:mm:ss)	00 : 00 : 00	Menu Level
IDE Primary Master	Press Enter 13020 MB	Change the day, month, Year and century
IDE Primary Slave	Press Enter None	
IDE Secondary Master	Press Enter None	
IDE Secondary Slave	Press Enter None	
Drive A	None	
Drive B	None	
Halt On	All, But Keyboard	
Base Memory	640K	
Extended Memory	129024K	
Total Memory	130048K	

At the bottom of the menu are the control keys for use on this menu. If you need any help in each item field, you can press the <F1> key. It will display the relevant information to help you. The memory display at the lower right-hand side of the menu is read-only. It will adjust automatically according to the memory changed. The following describes each item of this menu.

Date

The date format is:

Day : Sun to Sat
Month : 1 to 12
Date : 1 to 31
Year : 1994 to 2079

To set the date, highlight the “Date” field and use the PageUp/PageDown or +/- keys to set the current time.

Time

The time format is: **Hour** : 00 to 23
 Minute : 00 to 59
 Second : 00 to 59

To set the time, highlight the “Time” field and use the <PgUp>/<PgDn> or +/- keys to set the current time.

IDE Primary HDDs / IDE Secondary HDDs

The onboard PCI IDE connectors provide Primary and Secondary channels for connecting up to four IDE hard disks or other IDE devices. Each channel can support up to two hard disks; the first is the “Master” and the second is the “Slave”.

Press <Enter> to configure the hard disk. The selections include Auto, Manual, and None. Select ‘Manual’ to define the drive information manually. You will be asked to enter the following items.

CYLS : Number of cylinders
HEAD : Number of read/write heads
PRECOMP : Write precompensation
LANDZ : Landing zone
SECTOR : Number of sectors

The Access Mode selections are as follows:

Auto
Normal (HD < 528MB)
Large (for MS-DOS only)
LBA (HD > 528MB and
supports Logical Block
Addressing)

Drive A / Drive B

These fields identify the types of floppy disk drive A or drive B that has been installed in the computer. The available specifications are:

360KB 1.2MB 720KB 1.44MB 2.88MB
5.25 in. 5.25 in. 3.5 in. 3.5 in. 3.5 in.

Halt On

This field determines whether or not the system will halt if an error is detected during power up.

No errors	The system boot will not be halted for any error that may be detected.
All errors	Whenever the BIOS detects a non-fatal error, the system will stop and you will be prompted.
All, But Keyboard	The system boot will not be halted for a keyboard error; it will stop for all other errors
All, But Diskette	The system boot will not be halted for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not be halted for a keyboard or disk error; it will stop for all others.

Advanced BIOS Features

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features

		ITEM HELP
Virus Warning	Disabled	Menu Level Allows you choose the VIRUS warning feature for IDE Hard Disk boot sector protection. If this function is enabled and someone attempt to write data into this area, BIOS will show a warning message on screen and alarm beep
CPU Internal Cache	Enabled	
External Cache	Enabled	
CPU L2 Cache ECC Checking	Enabled	
Processor Number Feature	Enabled	
Quick Power On Self Test	Enabled	
First Boot Device	HDD-0	
Second Boot Device	HDD-0	
Third Boot Device	CDROM	
Boot Other Device	Enabled	
Swap Floppy Drive	Disabled	
Boot Up Floppy Seek	Disabled	
Boot Up Numlock Status	On	
Gate A20 Option	Fast	
Typeomatic Rate Setting	Disabled	
Typeomatic Rate (chars/Sec)	6	
Typeomatic Delay (Msec)	250	
Security Option	Setup	
OS Select For DRAM>64MB	Non-OS2	
Video BIOS Shadow	Enabled	
C8000-CBFFF Shadow	: Disabled	
CC000-CFFFF Shadow	: Disabled	
D0000-D3FFF Shadow	: Disabled	
D4000-D7FFF Shadow	: Disabled	
D8000-DBFFF Shadow	: Disabled	
DC000-DFFF Shadow	: Disabled	
Small Logo (EPA) Show	: Enabled	

Virus Warning

This item protects the boot sector and partition table of your hard disk against accidental modifications. If an attempt is made, the BIOS will halt the system and display a warning message. If this occurs, you can either allow the operation to continue or run an anti-virus program to locate and remove the problem.

CPU Internal Cache / External Cache

Cache memory is additional memory that is much faster than conventional DRAM (system memory). CPUs from 486-type on up contain internal cache memory, and most, but not all, modern PCs have additional (external) cache memory. When the CPU requests data, the system transfers the requested data from the main DRAM into cache memory, for even faster access by the CPU. These items allow you to enable (speed up memory access) or disable the cache function. By default, these items are *Enabled*.

CPU L2 Cache ECC Checking

This field enables or disables the ECC (Error Correction Checking) checking of the CPU level-2 cache. The default setting is *Enabled*.

Processor Number Feature

When enabled, this feature allows external systems to detect the processor number/type of the CPU.

Quick Power On Self Test

When enabled, this field speeds up the Power On Self Test (POST) after the system is turned on. If it is set to *Enabled*, BIOS will skip some items.

First/Second/Third Boot Device

These fields determine the drive that the system searches first for an operating system. The options available include *Floppy*, *LS/ZIP*, *HDD-0*, *SCSI*, *CDROM*, *HDD-1*, *HDD-2*, *HDD-3*, *LAN* and *Disable*.

Boot Other Device

These fields allow the system to search for an operating system from other devices other than the ones selected in the First/Second/Third Boot Device.

Swap Floppy Drive

This item allows you to determine whether or not to enable Swap Floppy Drive. When enabled, the BIOS swaps floppy drive assignments so that Drive A becomes Drive B, and Drive B becomes Drive A. By default, this field is set to *Disabled*.

Boot Up Floppy Seek

When enabled, the BIOS will seek whether or not the floppy drive installed has 40 or 80 tracks. 360K type has 40 tracks while 760K, 1.2M and 1.44M all have 80 tracks.

Boot Up NumLock Status

This allows you to activate the NumLock function after you power up the system.

Gate A20 Option

This field allows you to select how Gate A20 is worked. Gate A20 is a device used to address memory above 1 MB.

Typematic Rate Setting

When disabled, continually holding down a key on your keyboard will generate only one instance. When enabled, you can set the two typematic controls listed next. By default, this field is set to **Disabled**.

Typematic Rate (Chars/Sec)

When the typematic rate is enabled, the system registers repeated keystrokes speeds. Settings are from 6 to 30 characters per second.

Typematic Delay (Msec)

When the typematic rate is enabled, this item allows you to set the time interval for displaying the first and second characters. By default, this item is set to **250msec**.

Security Option

This field allows you to limit access to the System and Setup. The default value is **Setup**. When you select **System**, the system prompts for the User Password every time you boot up. When you select **Setup**, the system always boots up and prompts for the Supervisor Password only when the Setup utility is called up.

OS Select for DRAM > 64MB

This option allows the system to access greater than 64MB of DRAM memory when used with OS/2 that depends on certain BIOS calls to access memory. The default setting is **Non-OS/2**.

Video BIOS Shadow

This item allows you to change the Video BIOS location from ROM to RAM. Video Shadow will increase the video speed.

C8000 - CBFFF Shadow/DC000 - DFFFF Shadow

Shadowing a ROM reduces the memory available between 640KB to 1024KB. These fields determine whether or not optional ROM will be copied to RAM.

Small Logo (EPA) Show

This field enables the showing of the EPA logo located at the upper right of the screen during boot up.

Advanced Chipset Features

This Setup menu controls the configuration of the chipset.

Phoenix - AwardBIOS CMOS Setup Utility
Advanced Chipset Features

		ITEM HELP
DRAM Timing By SPD	Enabled	Menu Level
Memory Hole	Disabled	
P2C/C2P Concurrency	Enabled	
System BIOS Cacheable	Disabled	
Video BIOS Cacheable	Disabled	
Frame Buffer Size	8M	
AGP Aperture Size	64M	
AGP-4X Mode	Enabled	
AGP Driving Control	Auto	
Panel Type	07	
Boot Device Select	Both	
OnChip USB	Enabled	
OnChip USB2	Enabled	
Power Supply Type	ATX	
USB Keyboard Support	Enabled	
OnChip Sound	Enabled	
CPU to PCI Write Buffer	Enabled	
PCI Dynamic Bursting	Enabled	
PCI Master 0 WS Write	Enabled	
PCI#2 Access #1 Retry	Enabled	
PCI Delay Transaction	Disabled	
AGP Master 1 WS Write	Disabled	
AGP Master 1 WS Read	Disabled	

DRAM Timing by SPD

This field enables or disables the DRAM Timing based on SPD.

Memory Hole

It is recommended to leave as disabled, although enabling 15M-16M can help with sound issues.

P2C / C2P Concurrency

Set to Disabled for best performance. You may set this to Enabled if you want any sort of system stability.

System BIOS Cacheable

The setting of *Enabled* allows caching of the system BIOS ROM at F000h-FFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

Video BIOS Cacheable

The Setting *Enabled* allows caching of the video BIOS ROM at C0000h-F7FFFh, resulting in better video performance. However, if any program writes to this memory area, a system error may result.

Frame Buffer Size

The default setting of the frame buffer size is 8M.

AGP Aperture Size

The field sets aperture size of the graphics. The aperture is a portion of the PCI memory address range dedicated for graphics memory address space. Host cycles that hit the aperture range are forwarded to the AGP without any translation. The default setting is **64M**.

AGP-4X Mode

The field enables or disables the AGP-4X mode of the integrated VGA function.

AGP Driving Control

This BIOS function allows you to adjust the control of the AGP driving force. It is set to Auto by default.

Panel Type

This field sets the panel type that is supported by the system. Below are the selections for the different panel types:

Panel Type 0	640x480	18bit	TFT
1	800x600	18bit	TFT
2	1024x768	36bit	TFT
3	1280x1024	36bit	TFT
4	640x480	16bit	DSTN
5	800x600	16bit	DSTN
6	1024x768	16bit	DSTN
7	1024x768	18bit	1CH LVDS
8	640x480	18bit	TFT
9	800x600	18bit	TFT
A	1024x768	18bit	TFT
B	1280x1024	18bit	TFT
C	1400x1050	36bit	2CH LVDS
D	800x600	16bit	DSTN
E	1024x768	16bit	DSTN
F	1280x1024	16bit	DSTN

OnChip USB / OnChip USB2

The default setting of this field is Enabled to enable the USB function on board.

Power Supply Type

The default setting of this field is ATX.

OnChip Keyboard Support

Enable this if you are using a USB keyboard.

OnChip Sound

This field enables or disables the on board audio function.

CPU to PCI Write Buffer

This controls the CPU write buffer to the PCI bus. If this buffer is disabled, the CPU writes directly to the PCI bus. The default setting is *Enabled*.

PCI Dynamic Bursting

This option controls the PCI write buffer. If this is enabled, then every write transaction on the PCI bus goes straight to the write buffer. Burst transactions are then sent on their way as soon as there are enough to send in a single burst.

PCI Master 0 WS Write

This function determines whether there's a delay before any writes to the PCI bus. If this is enabled, then writes to the PCI bus are executed immediately (with zero wait states), as soon as the PCI bus is ready to receive data. But if it is disabled, then every write transaction to the PCI bus is delayed by one wait state. It's recommended to enable this for faster PCI performance.

PCI#2 Access #1 Retry

This BIOS feature is linked to the CPU to PCI Write Buffer. Normally, the CPU to PCI Write Buffer is enabled. All writes to the PCI bus are, as such, immediately written into the buffer, instead of the PCI bus. This frees up the CPU from waiting till the PCI bus is free. The data are then written to the PCI bus when the next PCI bus cycle starts.

PCI Delay Transaction

The chipset has an embedded 32-bit posted write buffer to support delay transactions cycles. Select *Enabled* to support compliance with PCI specification version 2.1.

AGP Master 1 WS Write/Read

When enabled a single wait state is used when writing/reading to the AGP bus. When disabled a 2 wait state is used. For optimal performance set this to enabled. For improved stability set it to disabled.

Integrated Peripherals

This section sets configurations for your hard disk and other integrated peripherals.

Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals

		ITEM HELP
On-Chip IDE Channel 0	Enabled	Menu Level
On-Chip IDE Channel 1	Enabled	
IDE Prefetch Mode	Enabled	
IDE Primary Master PIO	Auto	
IDE Primary Slave PIO	Auto	
IDE Secondary Master PIO	Auto	
IDE Secondary Slave PIO	Auto	
IDE Primary Master UDMA	Auto	
IDE Primary Slave UDMA	Auto	
IDE Secondary Master UDMA	Auto	
IDE Secondary Slave UDMA	Auto	
Init Display First	PCI Slot	
IDE HDD Block Mode	Enabled	
Onboard FDD Controller	Enabled	
Onboard Serial Port 1	3F8/IRQ4	
Onboard Serial Port 2	2F8/IRQ3	
UART 2 Mode	Standard	
Onboard Parallel Port	378/IRQ7	
Onboard Parallel Mode	Normal	
Onboard Serial Port 3	3E8H	
ECP Mode Use DMA	3	
Parallel Port EPP Type	EPP 1.9	
Serial Port 3 Use IRQ	IRQ10	
Onboard Serial Port 4	2E8H	
Serial Port 4 Use IRQ	IRQ11	
Onboard Legacy Audio	Disabled	

OnChip IDE Channel 0 / 1

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Select *Enabled* to activate each channel separately.

IDE Prefetch Mode

These field enables/disables the prefetch buffers in the PCI IDE controller. The prefetch buffers are used as a temporary storage place as data is transferred from one location to another.

IDE Primary/Secondary Master/Slave PIO

These fields allow your system hard disk controller to work faster. Rather than have the BIOS issue a series of commands that transfer to or from the disk drive, PIO (Programmed Input/Output) allows the BIOS to communicate with the controller and CPU directly. The system supports five modes, numbered from 0 (default) to 4, which primarily differ in timing. When Auto is selected, the BIOS will select the best available mode.

IDE Primary/Secondary Master/Slave UDMA

These fields allow your system to improve disk I/O throughput to 33Mb/sec with the Ultra DMA/33 feature. The options are *Auto* and *Disabled*.

Init Display First

This field allows the system to initialize first the VGA card on chip or the display on the PCI Slot. By default, the *PCI Slot* VGA is initialized first.

IDE HDD Block Mode

This field allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive.

Onboard FDD Controller

Select *Enabled* if your system has a floppy disk controller installed on the board and you wish to use it. If you install an add-in FDC or the system has no floppy drive, select *Disabled* in this field. This option allows you to select the onboard FDD port.

Onboard Serial/Parallel Port

These fields allow you to select the onboard serial and parallel ports and their addresses. The default values for these ports are:

Serial Port 1	3F8H/IRQ4
Serial Port 2	2F8H/IRQ3
Serial Port 3	3E8H/IRQ10
Serial Port 4	2E8H/IRQ11
Parallel Port 2	Disabled

UART 2 Mode

This item allows you to determine which Infra Red (IR) function of onboard I/O chip. The options are *Standard*, *IrDA*, and *ASKIR*.

Parallel Port Mode

This field allows you to determine parallel port mode function.

SPP	Standard Printer Port
EPP	Enhanced Parallel Port
ECPP	Extended Capabilities Port

Onboard Legacy Audio

Enable or disable the on board legacy audio with this option. If enabled, some audio options will appear.

Power Management Setup

The Power Management Setup allows you to save energy of your system effectively.

Phoenix - AwardBIOS CMOS Setup Utility
Power Management Setup

Power Management	Press Enter	ITEM HELP
PM Control by APM	Yes	Menu Level
Video Off Option	Suspend -> Off	
Video Off Method	V/H Sync + Blank	
Modem Use IRQ	3	
Soft-Off by PWRBTN	Instant-Off	
Thermal Duty Cycle	50%	
Wake Up Events	Press Enter	

Phoenix - AwardBIOS CMOS Setup Utility
Wake Up Events

Power Management	User Define	ITEM HELP
HDD Power Down	Disabled	Menu Level
Doze Mode	Disabled	
Suspend Mode	Disabled	

Phoenix - AwardBIOS CMOS Setup Utility
IRQ/Event Activity Detect

VGA	OFF	ITEM HELP
LPT & COM	LPT / COM	Menu Level
HDD & FDD	ON	
PCI Master	OFF	
PowerOn by PCI Card	Disabled	
Modem Ring Resume	Disabled	
RTC Alarm Resume	Disabled	
Primary INTR	On	
IRQs Activity Monitoring	Press Enter	

Phoenix - AwardBIOS CMOS Setup Utility
IRQs Activity Monitoring

IRQ3	Enabled	ITEM HELP
IRQ4	Enabled	Menu Level
IRQ5	Enabled	
IRQ6	Enabled	
IRQ7	Enabled	
IRQ8	Disabled	
IRQ8	Disabled	
IRQ10	Disabled	
IRQ11	Disabled	
IRQ12	Enabled	
IRQ13	Enabled	
IRQ14	Enabled	
IRQ15	Disabled	

Power Management

When you press Enter while selecting this field, the menu for Power Management appears. The following are the fields in this menu.

Power Management

This field allows you to select the type of power saving management modes. There are four selections for Power Management.

Min. Power Saving	Minimum power management
Max. Power Saving	Maximum power management.
User Define	Each of the ranges is from 1 min. to 1hr. Except for HDD Power Down
(Default)	which ranges from 1 min. to 15 min.

Under this option, you can also configure other features such HDD Power Down, Doze Mode and Suspend Mode.

HDD Power Down

After the selected period of drive inactivity, the hard disk drive powers down while all other devices remain active. Control of this mode is independent of the Power Management mode selected previously.

Doze Mode

After the selected period of system inactivity, the CPU clock runs at slower speed while all other devices still operate at full speed.

Suspend Mode

This option decides when to shutdown video for power saving. You can select it as always on or turn off video when system enters suspend mode.

PM Control by APM

If Advanced Power Management (APM) is installed on your system, selecting Yes gives better power savings.

Video Off Option

This option decides when to shutdown video for power saving. You can select it as always on or turn off video when system enters suspend mode.

Video Off Method

This field defines the Video Off features. There are three options.

V/H SYNC + Blank	Default setting, blank the screen and turn off vertical and horizontal scanning.
DPMS	Allows the BIOS to control the video display card if it supports the DPMS feature.
Blank Screen	This option only writes blanks to the video buffer.

Modem Use IRQ

This field sets the IRQ used by the Modem. By default, the setting is **3**.

Soft-Off by PWRBTN

This field defines the power-off mode when using an ATX power supply. The *Instant Off* mode allows powering off immediately upon pressing the power button. In the *Delay 4 Sec* mode, the system powers off when the power button is pressed for more than four seconds or enters the suspend mode when pressed for less than 4 seconds. The default value is ***Instant Off***.

Thermal Duty Cycle

This field enables or disables the thermal duty cycle.

Wake Up Events

The HDD, FDD, COM, LPT Ports, and PCI PIRQ are I/O events which can prevent the system from entering a power saving mode or can awaken the system from such a mode. When an I/O device wants to gain the attention of the operating system, it signals this by causing an IRQ to occur. When the operating system is ready to respond to the request, it interrupts itself and performs the service.

PNP/PCI Configurations

This option configures the PCI bus system. All PCI bus systems on the system use INT#, thus all installed PCI cards must be set to this value.

Phoenix - AwardBIOS CMOS Setup Utility
PnP/PCI Configurations

PNP OS Install	No	ITEM HELP
Reset Configuration Data	Disabled	Menu Level
Resources Controlled By	Manual	Default is Disabled.
IRQ Resources	Press Enter	Select Enabled to reset
DMA Resources	Press Enter	Extended System
		Configuration Data
		(ESCD) when you exit
PCI/VGA Palette Snoop	Disabled	Setup if you have
Assign IRQ for VGA	Enabled	installed a new add-on
Assign IRQ for USB	Enabled	and the system
		reconfiguration has
		caused such a serious
		conflict that the OS
		cannot boot

PNP OS Install

Enable the PNP OS Install option if it is supported by the operating system installed. The default value is *No*.

Reset Configuration Data

This field allows you to determine whether to reset the configuration data or not. The default value is *Disabled*.

Resources Controlled by

This PnP BIOS can configure all of the boot and compatible devices automatically with the use of a use a PnP operating system such as Windows 95.

PCI/VGA Palette Snoop

Some non-standard VGA display cards may not show colors properly. This field allows you to set whether or not MPEG ISA/VESA VGA cards can work with PCI/VGA. When this field is enabled, a PCI/VGA can work with an MPEG ISA/VESA VGA card. When this field is disabled, a PCI/VGA cannot work with an MPEG ISA/VESA card.

Assign IRQ for VGA/USB

By default, this fields are Enabled.

PC Health Status

This section shows the parameters in determining the PC Health Status. These parameters include temperatures, fan speeds and voltages.

Phoenix - AwardBIOS CMOS Setup Utility		
PC Health Status		
CPU Warning Temperature	80°C/176°F	ITEM HELP
Current System Temp.	34°C/95°F	
Current CPU Temperature	28°C/82°F	
Current CPUFan Speed	4166 RPM	
Current SystemFan Speed	0 RPM	
Vcore (V)	1.4+5V	
2.+5V	2.47V	
3.3(V)	3.34V	
5(V)	5.0+5V	
12(V)	12.09V	

CPU Warning Temperature

This field sets the temperature threshold that when reached, the system would give an audible warning.

Temperatures/Fan Speeds/Voltages

These fields are the parameters of the hardware monitoring function feature of the board. The values are read-only values as monitored by the system and show the PC health status.

Frequency/Voltage Control

This section shows the user how to configure the processor frequency.

Phoenix - AwardBIOS CMOS Setup Utility
Frequency/Voltage Control

VIA C3 Clock Ratio	Default	ITEM HELP
Auto Detect DIMM/PCI Clk	Disabled	Menu Level
Spread Spectrum	Disabled	
Host CPU/PCI Clock	Default	

VIA C3 Clock Ratio

This field sets the clock ratio of the C3 processor. The default setting is **Default**. This means that the clock ratio uses the clock ratio that is default with the processor.

Auto Detect DIMM/PCI Clk

This field enables or disables the auto detection of the DIMM/PCI clock. The default setting is **Disabled**.

Spread Spectrum

This field sets the value of the spread spectrum. The default setting is **Disabled**. This field is for CE testing use only.

Host CPU/PCI Clock

The Host CPU/PCI Clock has a default setting of **Default** which automatically detects the systems host CPU clock and PCI clock. You can also use this parameter to overclock your system. However, it is important to note that overclocking the system/CPU can cause your system to become unstable or crash.

Load Fail-Safe Defaults

This option allows you to load the troubleshooting default values permanently stored in the BIOS ROM. These default settings are non-optimal and disable all high-performance features.

Load Setup Defaults

This option allows you to load the default values to your system configuration. These default settings are optimal and enable all high performance features.

Set Supervisor/User Password

These two options set the system password. Supervisor Password sets a password that will be used to protect the system and Setup utility. User Password sets a password that will be used exclusively on the system. To specify a password, highlight the type you want and press <Enter>. The Enter Password: message prompts on the screen. Type the password, up to eight characters in length, and press <Enter>. The system confirms your password by asking you to type it again. After setting a password, the screen automatically returns to the main screen.

To disable a password, just press the <Enter> key when you are prompted to enter the password. A message will confirm the password to be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

Save & Exit Setup

This option allows you to determine whether or not to accept the modifications. If you type “Y”, you will quit the setup utility and save all changes into the CMOS memory. If you type “N”, you will return to Setup utility.

Exit Without Saving

Select this option to exit the Setup utility without saving the changes you have made in this session. Typing “Y” will quit the Setup utility without saving the modifications. Typing “N” will return you to Setup utility.

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Appendix

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses, which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 07Fh	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
278 - 27F	Parallel Port #2(LPT2)
2F8h - 2FFh	Serial Port #2(COM2)
2B0 - 2DF	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360 - 36F	Network Ports
3B0 - 3BF	Monochrome & Printer adapter
3C0 - 3CF	EGA adapter
3D0 - 3DF	CGA adapter
3F0h - 3F7h	Floppy Disk Controller
3F8h - 3FFh	Serial Port #1(COM1)

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Reserved
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port #1
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	Serial Port 3
IRQ11	Serial Port 4
IRQ12	PS/2 Mouse
IRQ13	80287
IRQ14	Primary IDE
IRQ15	Secondary IDE

C. STN Flat Panel Data Outputs

Pin	STN8	STN16	STN24	DSTN8	DSNT16	DSTN24	DSTN16	DSTN24
FPD0	R0	R0	R0	LR0	LR0	LR0		LB3
FPD1	G0	G0	G0			LR3		LB2
FPD2	B0	B0	B0	LG0	LG0	LG0	LB1	LB1
FPD3	R1	R1	R1				LB0	LB0
FPD4	G1	G1	G1	LB0	LB0	LB0		UB3
FPD5	B1	B1	B1					UB2
FPD6	R2	R2	R2	LR1	LR1	LR1	UB1	UB1
FPD7	G2	G2	G2			LG3	UB0	UB0
FPD8		B2	B2		LG1	LG1		LG3
FPD9		R3	R3				LG2	LG2
FPD10		G3	G3		LB1	LB1	LG1	LG1
FPD11		B3	B3				LG0	LG0
FPD12		R4	R4		LR2	LR2		UG3
FPD13		G4	G4			LB3	UG2	UG2
FPD14		B4	B4		LG2	LG2	UG1	UG1
FPD15		R5	R5				UG0	UG0
FPD16			G5					LR3
FPD17			B5				LR2	LR2
FPD18			R6	UR0	UR0	UR0	LR1	LR1
FPD19			G6			UR3	LR0	LR0
FPD20			B6	UG0	UG0	UG0		UR3
FPD21			R7				UR2	UR2
FPD22			G7	UB0	UB0	UB0	UR1	UR1
FPD23			B7				UR0	UR0
FPD24				UR1	UR1	UR1		
FPD25						UG3		
FPD26					UG1	UG1		
FPD27								
FPD28					UB1	UB1		
FPD29						UB3		
FPD30					UR2	UR2		
FPD31								
FPD32					UG2	UG2		
FPD33								
FPD34								
FPD35								

D. TFT Flat Panel Data Outputs

Pin	TFT9	TFT2x9	TFT12	TFT2x12	TFT15	TFT2x15	TFT18	TFT2x18	TFT24
FPD0								R00	R2
FPD1								R10	R0
FPD2					R0	R00	B0	R01	R3
FPD3						R10	B1	R11	
FPD4			R0	R00	R1	R01	B2	R02	R4
FPD5				R10		R11	B3	R12	
FPD6	R0	R00	R1	R01	R2	R02	B4	R03	R5
FPD7		R10		R11		R12	B5	R13	R1
FPD8	R1	R01	R2	R02	R3	R03		R04	R6
FPD9		R11		R12		R13		R14	
FPD10	R2	R02	R3	R03	R4	R04	G0	R05	R7
FPD11		R12		R13		R14	G1	R15	
FPD12							G2	G00	G2
FPD13							G3	G10	G0
FPD14					G0	G00	G4	G01	R3
FPD15						G10	G5	G11	
FPD16			G0	G00	G1	G01		G02	G4
FPD17				G10		G11		G12	
FPD18	G0	G00	G1	G01	G2	G02	R0	G03	G5
FPD19		G10		G11		G12	R1	G13	G1
FPD20	G1	G01	G2	G02	G3	G03	R2	G04	G6
FPD21		G11		G12		G13	R3	G14	
FPD22	G2	G02	G3	G03	G4	G04	R4	G05	G7
FPD23		G12		G13		G14	R5	G15	
FPD24								B00	B2
FPD25								B10	B0
FPD26					B0	B00		B01	B3
FPD27						B10		B11	
FPD28			B0	B00	B1	B01		B02	B4
FPD29				B10		B11		B12	
FPD30	B0	B00	B1	B01	B2	B02		B03	B5
FPD31		B10		B11		B12		B13	B1
FPD32	B1	B01	B2	B02	B3	B03		B04	B6
FPD33		B11		B12		B13		B14	
FPD34	B2	B02	B3	B03	B4	B04		B05	B7
FPD35		B12		B13		B14		B15	